

Kicker Design Discussions Held at PAC 2007

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People I have talked to

- Mark Palmer (Cornell University)
- Junji Urakawa (KEK)
- Fabio Marcellini (IFN)
- Giancarlo Sensolini (IFN)
- Stefano de Santis (LBNL)

The kickers which are being designed right now

- KEK will have 4 sets of kickers which work at 10kV. The aperture will be 12 mm.
 - Naito
- Two sets of kickers being designed by Stefano for KEK (24 mm aperture)
 - Simulations only. Not quite complete because feedthru dimensions not known.
- The most mature design is from Frascati. Prototype ready for testing next week.

Frascati Design

- 1 m long.
- Race track aperture: 43mm x 60mm.
- Tapered design. Only 3 mm between feedthru and plates.
 - The use of a tapered design has 3 advantages
 - No sparking between feedthru and plate because of short distance
 - Smooth impedance change seen by beam.
 - More uniform field seen by beam?
- Feedthru' design has been fixed by the Frascati team.

Frascati Design (cont'd)

- High voltage cables come from FID technologies.
- Pulser is from FID technologies.
 - 50kV, 300 ps rise time, 5ns flattop, 2ns fall time. No secondary pulse! Rep rate? Frascati repetition requirements are not the same as the ILC kicker specs.
- They will start doing RF measurements next week. They will send us the measurements once it is done.

What I have right now

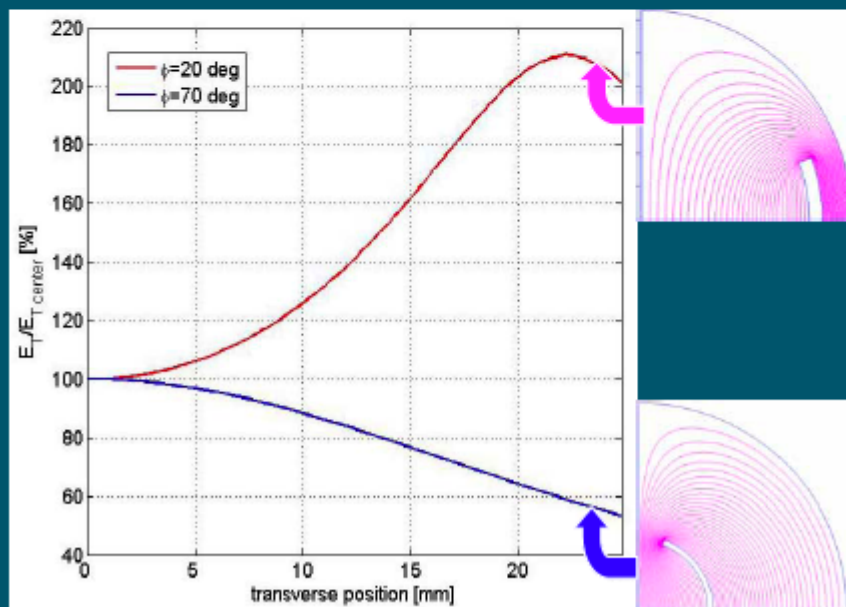
- Drawings of the Frascati design.
 - Bill of Materials will be sent out to us.
 - We also have the feedthru' design

2) Correction of the deflecting field flatness using tapers (1/2)

- a) **Tapers** are usually used to avoid abrupt steps in the section of the vacuum chamber in order to **reduce the intensity of wakefields and HOM** (impedance of the machine).

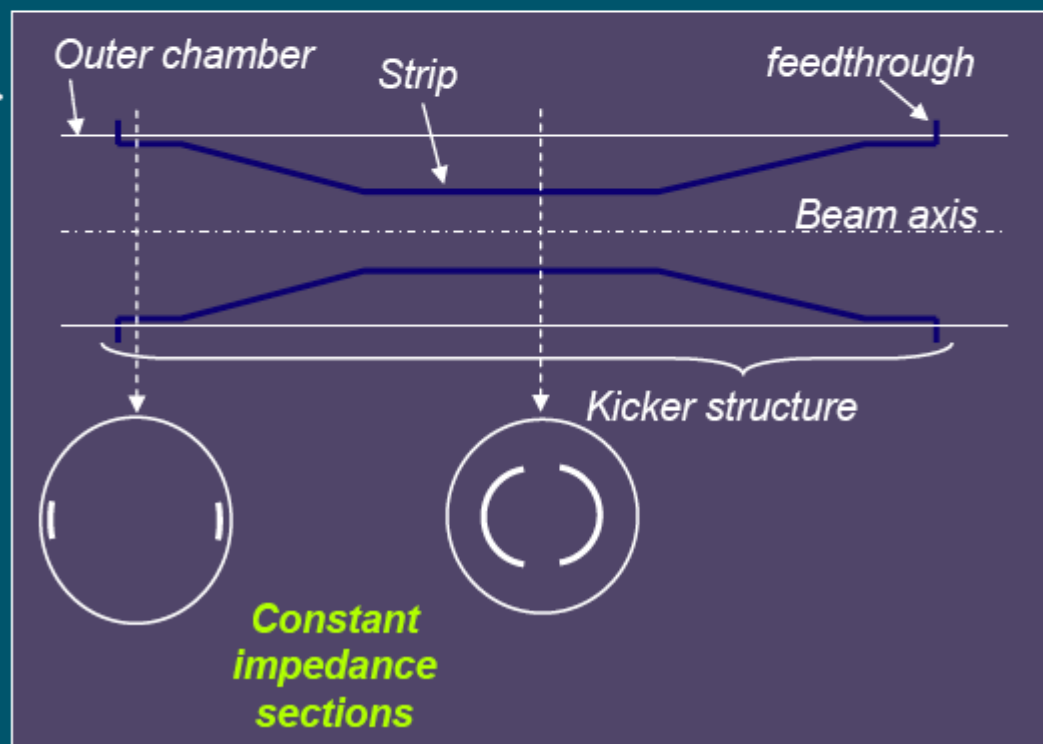


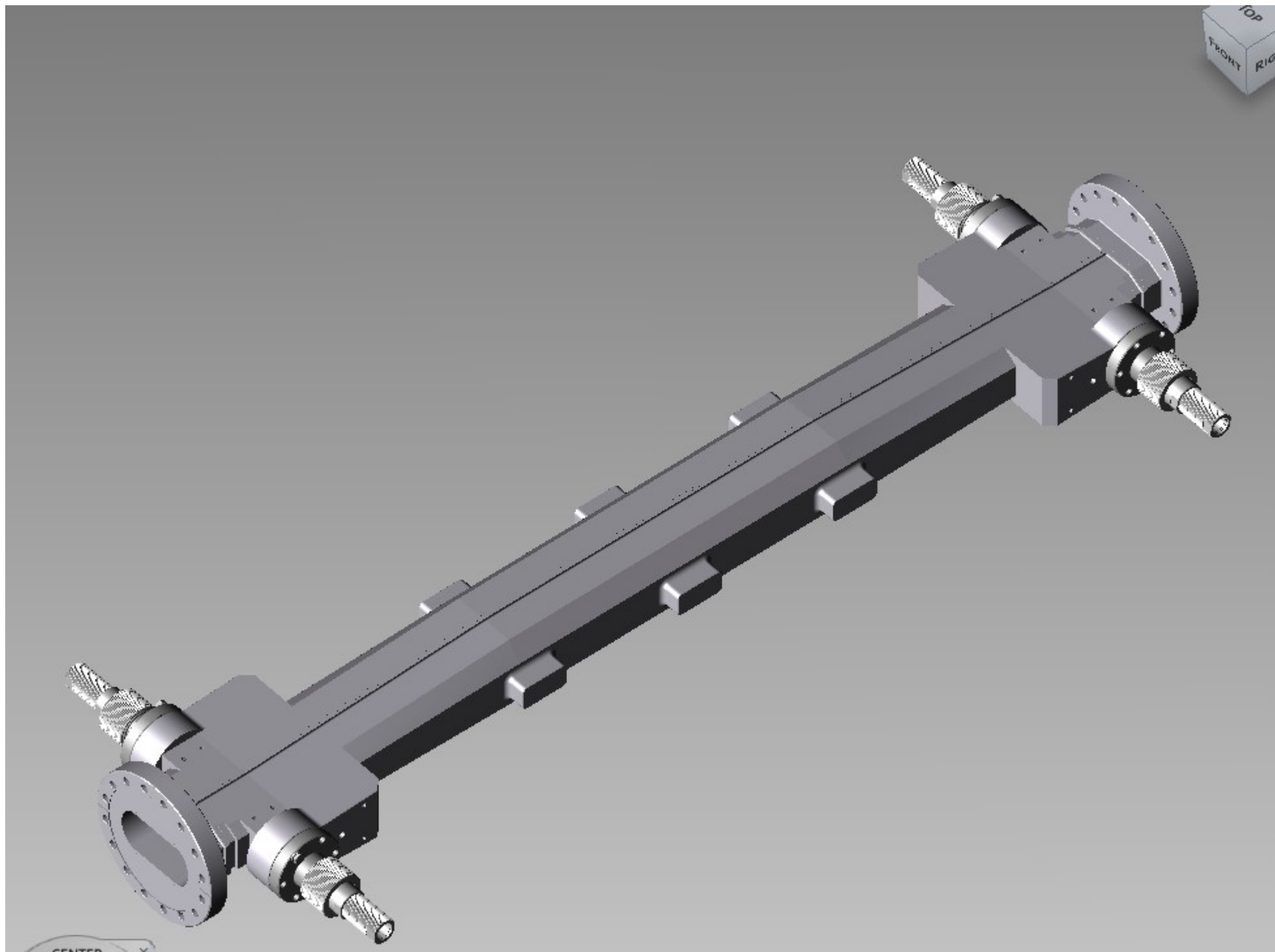
- b) The **uniformity of the deflection** depends on the coverage angle.

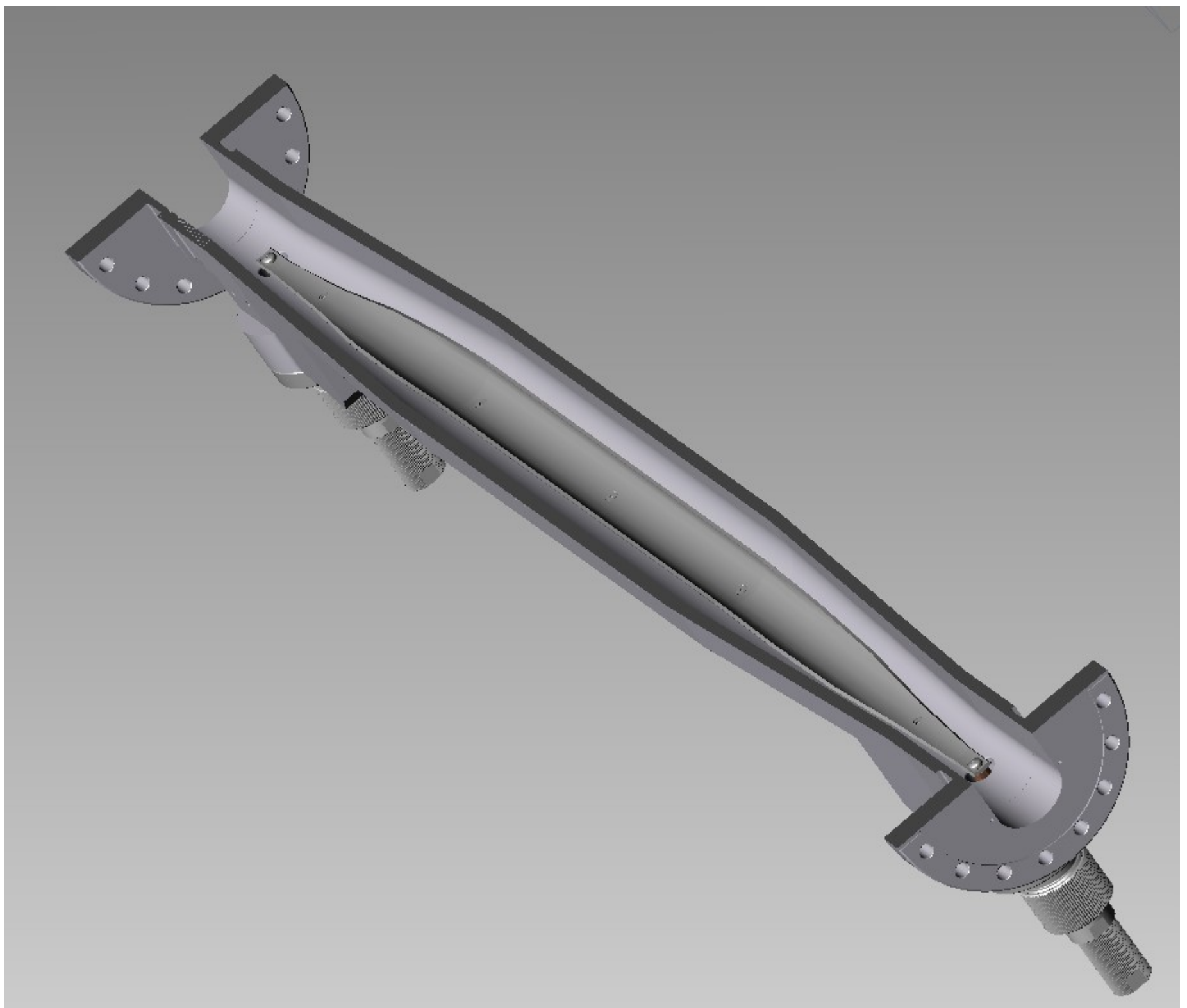


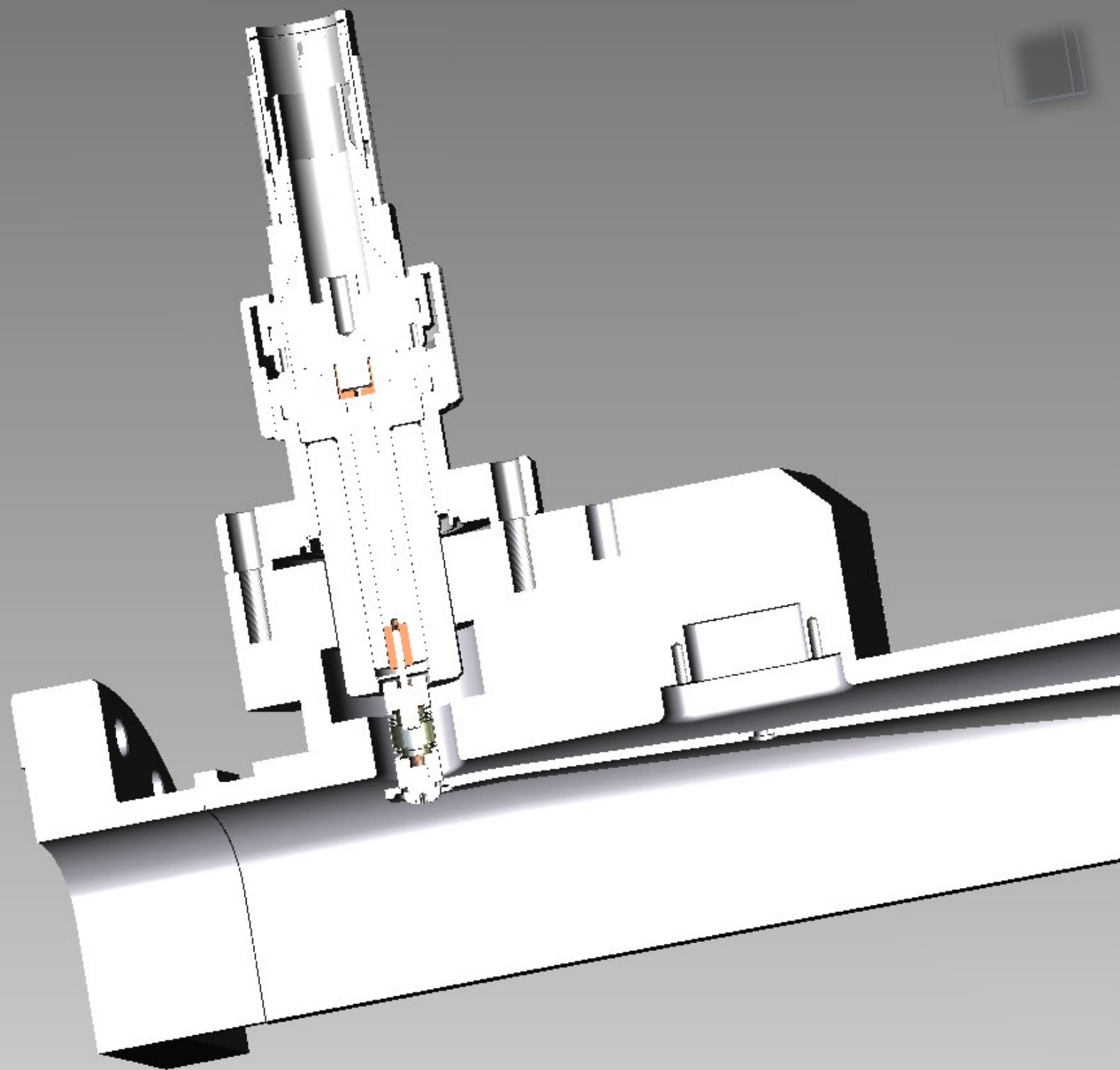
Tapering the transition between the kicker structure and the adjacent beam pipe it is possible to minimize:

- The non uniformity of transverse deflection as a function of the transverse position;
- The contribution of the kicker to the impedance of the machine.

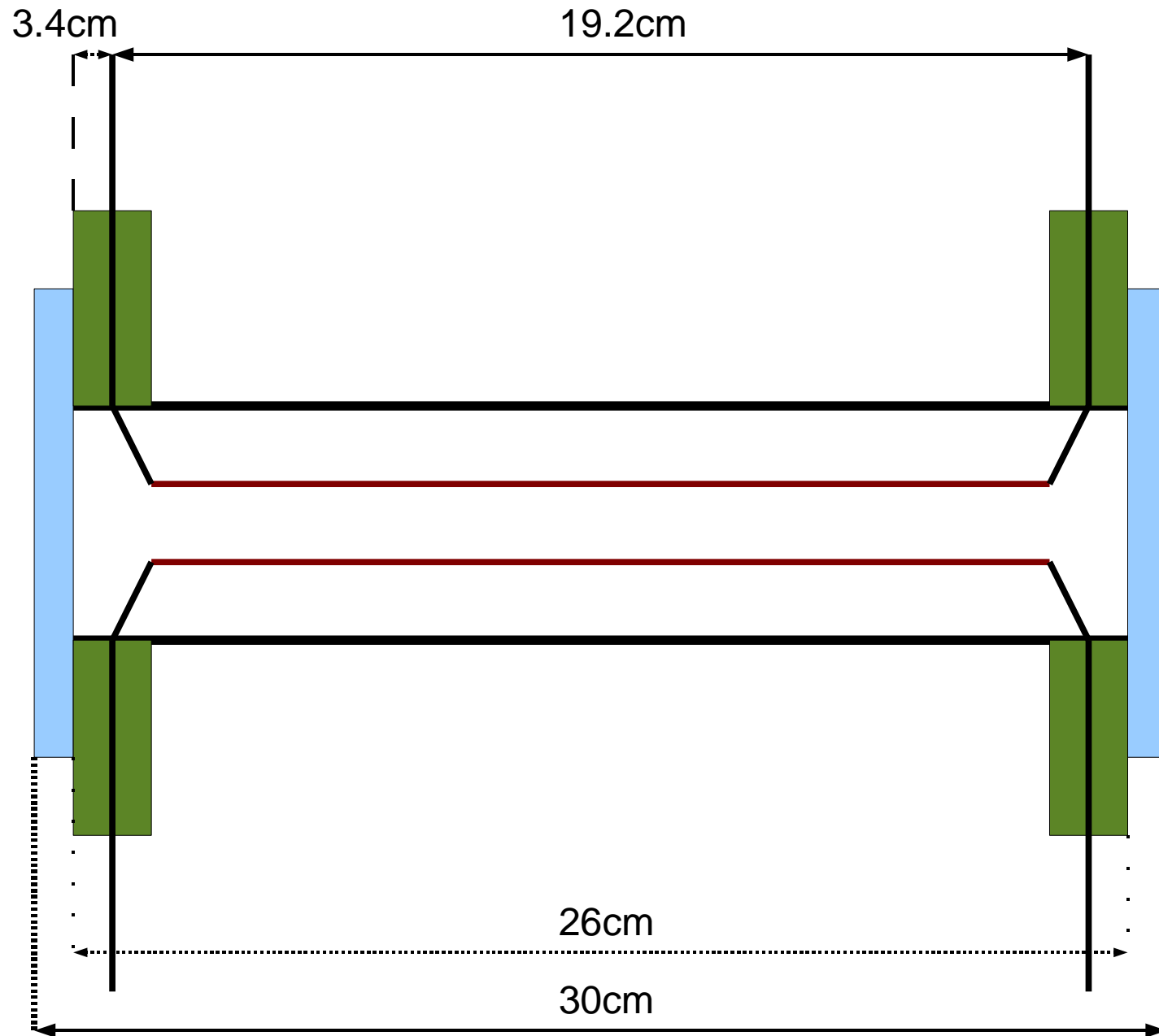


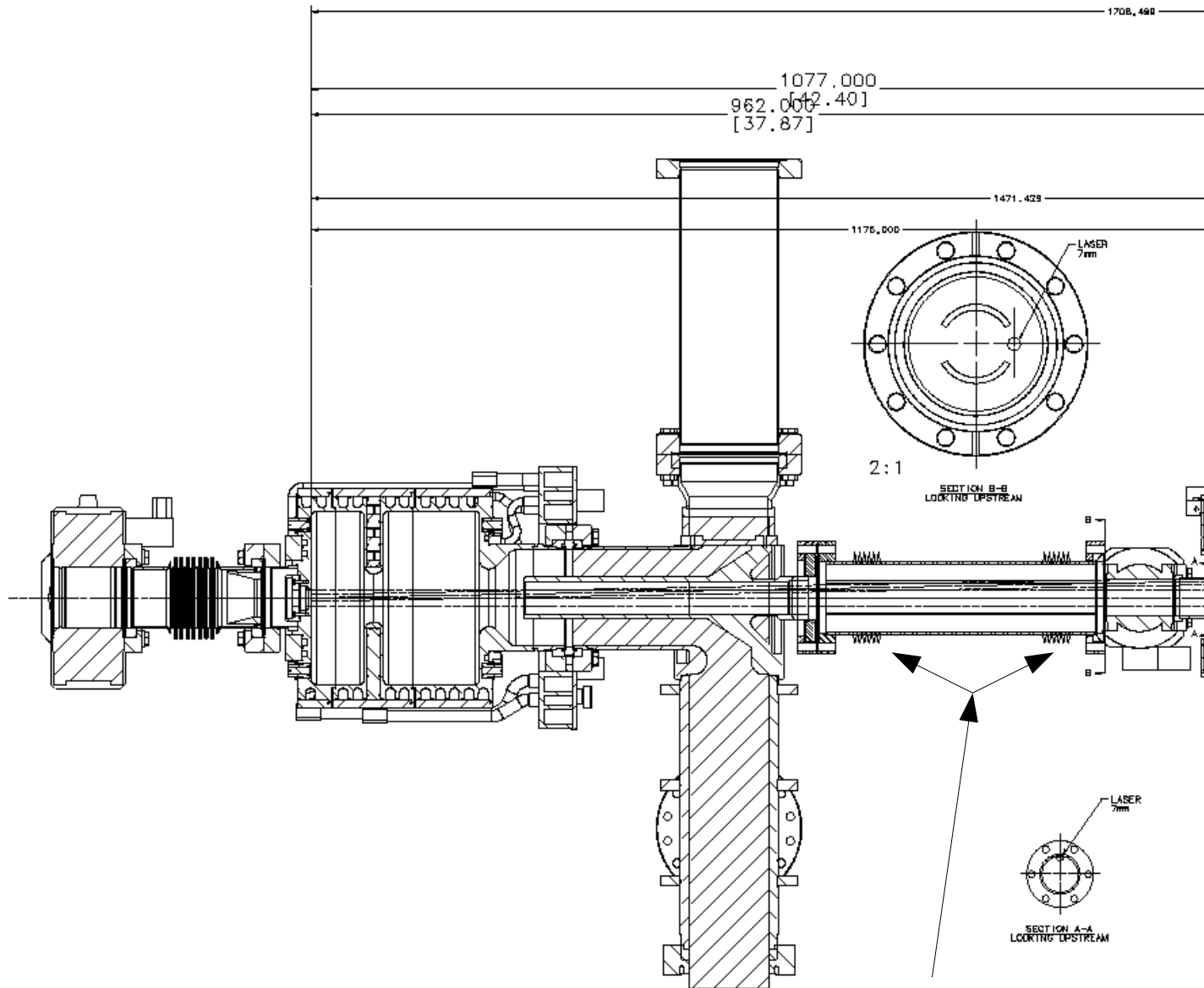






Cartoon of our kicker dimensions





Bellows shorten length by about 10cm!

For 20 mrad kick

- Original specs: If $l = 25$ cm, then $pd = 7$ kV.
- If $l = 15$ cm (for 19.2 cm, assume 20% for taper), then $pd = 11.6$ kV.
- If $l = 7$ cm then (for 9.2cm, assume 20% for taper), then $pd = 23.7$ kV.

Plan

- Do HFSS simulation (Ding) for current Frascati design.
- Do HFSS simulation for our kicker. Dimensions to be decided.
- Build prototype for electrical measurements.
 - Use the same feedthru's as Frascati.
- Build prototype for high power test.
 - Material: stainless or aluminium?
- Build final design for NML.